

## Effect of Salt on Umami and Flavor Components in Dashi from Kelp and Dried Bonito

Yoshiyuki Watanabe

Kindai University

### Summary

The preparation of Dashi soup is a traditional Japanese process established over a long period of time by experienced craftsmen. Recent scientific studies have been used to improve Dashi quality and investigate phenomena occurring during the preparation. However, there is little information about the extraction of umami components, particularly for the production of flavor components, even though it is known that the components contribute to the palatability of Dashi. This study examines the effect of water hardness, defined as the total concentration of calcium and magnesium ions, on umami and flavor components in Dashi soup prepared by kelp and dried bonito.

To prepare Dashi, this study used commercial and tap waters of different hardness levels, as measured by a chelatometric titration. Five grams of kelp was heated at 60°C in 300 mL of each type of water for 1 h; the kelp was then removed, and the same type of water was added to bring the kelp-Dashi sample to a volume of 300 mL. Then, 10 g of dried bonito was added to the sample, and the mixture was heated at 85°C for 2 min to obtain the bonito-Dashi sample. The color difference, turbidity, and pH of these samples were measured, and the umami and flavor components in the samples were analyzed by HPLC and GC/MS.

We found that the color difference for bonito-Dashi samples decreased with increasing water hardness and that the turbidity of the samples rapidly increased at more than a specific hardness. Glutamic acid amounts in bonito-Dashi samples decreased marginally with increases in water hardness, whereas the extracted amounts of inosinic and guanylic acids remained unchanged. The levels of acidic amino acids, such as glutamic and aspartic acids, were the highest in bonito-Dashi samples, although the amount of most of extracted amino acids did not depend on water hardness. Using SPME analysis, four compounds in kelp-Dashi samples and eight compounds in bonito-Dashi samples were identified as volatile components. The chromatograms showed a weak dependence of the peak area of these compounds on water hardness. Accordingly, it was concluded that water hardness affected significantly the appearance of the Dashi but not so much the amounts of umami and other flavor components.